

A NEW GENUS, *MEXOTIS*, FOR FIVE MEXICAN SPECIES OF  
HEDYOTIDEAE (RUBIACEAE)

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ABSTRACT

In further restriction of the concept of the genus *Hedyotis* in Mexico, four known species, *H. galeottii*, *H. kingii*, *H. latifolia*, and *H. terrellii*, are placed in a new genus **Mexotis**. A new species, **M. lorencei**, is recognized and described. Morphological and distributional data are provided and representative collections are cited.

RESUMEN

En la restricción adicional en el concepto del género *Hedyotis* en México, cuatro de las especies conocidas, *H. galeottii*, *H. kingii*, *H. latifolia*, y *H. terrellii*, se colocan en el nuevo género **Mexotis**. Se reconoce una nueva especie, **M. lorencei**. Se proporcionan los datos morfológicos y de distribución y se citan las colecciones representativas.

In early 20<sup>th</sup> century literature on the tribe Hedyotideae of the Rubiaceae the name *Hedyotis* L. was applied to many members of the tribe in both hemispheres. The main recent proponent of the name *Hedyotis* was Fosberg (1943) in his treatment of 24 Polynesian species of *Hedyotis*. He stated that he was adopting *Hedyotis* in the broadest sense because “the criteria to segregate the species involve not very fundamental differences in structure” (Terrell 1996:2–5). Under *Hedyotis* he recognized five subgenera and commented that many botanists would consider these as genera. Despite his broad view of genera, he favored extreme splitting for subdivisions of species, e.g., he described 39 named forms of *Hedyotis acuminata* (Cham. & Schltdl.) Steud. (now *Kadua acuminata* Cham. & Schltdl.). He also considered seed characters as unimportant because “they vary so much that no two are alike in a single capsule”. In subsequent papers Fosberg continued to use the name *Hedyotis*.

A recent study of Asian *Hedyotis* shows that many species related to the type, *Hedyotis fruticosa* L., of Sri Lanka and India, have unique capsule and seed morphology (Terrell & Robinson 2003). These species, in the genus *Hedyotis*, so far as known, are restricted to Asia and the western Pacific. Excluded from this concept are the mid-Pacific elements more recently treated as *Kadua* Cham. & Schltdl. (Terrell et al. 2005) and the New World species that have currently been placed in *Hedyotis*.

Many of the American Hedyotideae that were once placed in *Hedyotis* are now recognized as separate genera on the basis of structural features, particularly seeds and habit. Some of the segregate genera were described as new, including *Carterella*, with one Mexican species (Terrell 1987), *Stenaria* with five U.S. and Mexican species (Terrell 2001a), and *Stenotis* with seven Baja California and one Arizona species (Terrell 2001b). In addition, *Houstonia* and North American species of *Oldenlandia* each have five Mexican or Mexican-U.S. species (Terrell 1996; Terrell & Robinson 2006). In recent years further study has included about 12 additional hedyotoid genera. None of these genera were found to have seeds and other characters similar to those of the five species studied here.

We provide a further needed reclassification for Mexican *Hedyotis* species. A new genus, *Mexotis*, is described, including *Hedyotis galeottii*, *H. kingii*, *H. latifolia*, *H. terrellii*, and a newly described species, *M. lorencei*.

The removal of Western Hemisphere Hedyotideae from *Hedyotis* is supported by two recent studies

using DNA sequencing. In the DNA study of Andersson and Rova (1999), such species once placed in *Hedyotis* are not closely related to the Asian and eastern Pacific *Hedyotis*, the latter represented by *H. macrostegia* Stapf or the Central Pacific *H. hillebrandii* (Fosberg) Wagner & Herbst. (now *Kadua axillaris* (Wahra) Wagner & Lorence). In a more complete survey, Kårehed et al. (2008) show the division more clearly, and they call for the narrower interpretation of *Hedyotis*. Thus, the morphological and DNA evidence agree in the need to exclude American species of Hedyotideae from the genus *Hedyotis*. The Kårehed et al. study subdivides the Hedyotideae (as Spermaceae) into many discrete clades that are not only distinct from *Hedyotis*, but distinct from each other. Two such groups are the *Arcytophyllum/Houstonia/Stenaria* Clade, to which many of the previously studied American Hedyotideae listed above belong and the *Manettia/Bouvardia* branch, the latter being close to the *Spermaceae* Clade. No DNA sequences are available for any of the species placed here in *Mexotis*, and conclusions regarding which group is closest to *Mexotis* are based on structural features.

A paper by Church (2003) contributed an important molecular study on *Houstonia* and related genera, but did not include any of the five Mexican species that we investigate here.

*Mexotis* includes four species of large herbs or subshrubs with woody stems, long internodes, large elliptic or ovate leaves, long petioles, filiform pedicels, and generally flattened seeds with central punctiform hila. These species are native to Oaxaca and Veracruz. A fifth smaller species, *M. latifolia*, has herbaceous or woody-based stems and smaller leaves. It appears closely related to the four more robust species and ranges from Veracruz to Guatemala. This species is the only one of the five with a known chromosome number,  $n = 17$ , a number not known to occur in any other species of Hedyotideae.

The five species (Table 1; Figs. 1–5) have significant reproductive and vegetative characters. The seed types fall into two groups, the *kingii* group and the *galeottii* group. The *kingii* group is represented by *M. kingii*, the type species, which has somewhat thicker seeds, sometimes polygonal in outline and being often obtusely angulate or obtusely ridged. The compression is moderate or slight. These exact characters have not appeared in other Hedyotideae species. *Mexotis terrellii* is also in this group because of its apparent similarity to *M. kingii*; however, unfortunately the collections have immature seeds. The second seed type group includes *M. galeottii*, *M. latifolia*, and *M. lorencei*. These species have thin, flat or strongly compressed, concavo-convex seeds. In *M. galeottii* and *M. latifolia* the seeds are slightly to moderately concavo-convex. In *M. lorencei* the seeds become strongly concavo-convex and may appear cupulate. In *M. galeottii* and *M. latifolia* the seed areoles (cells) are radially elongated, and *M. galeottii* is unique in having narrow, usually partial, sometimes complete, wings. These same two characters also occur in the genus *Bouvardia*, which, however, carries the winged character to extremes, as many *Bouvardia* species have broad, conspicuous wings (and large capsules) (Blackwell (1968).

***Mexotis*** Terrell & H. Rob., gen. nov. TYPE SPECIES: *Mexotis kingii* (Terrell) Terrell & H. Rob.

Plantae perennes, saepe base lignosae, leniter herbaceae vel suffrutescens. Caules ad 1.5 m alti; laminae foliorum ad 11 cm longae ovatae vel ellipticae; corollae infundibulares; seminae planatae aut leniter compressae interdum alatae, hilis centralis punctiformibus, areolis distinctis isodiametricis vel radiate elongatis.

Perennial herbs or subshrubs typically with thick, woody, erect to decumbent, stems ca. 0.4–1.5 m long, in *M. latifolia* stems 15–55 cm tall, woody only at base. Leaves opposite, blades ovate to elliptic, acute to slightly acuminate, glabrous to sparsely or minutely puberulent or pubescent. Stipules interpetiolate. Inflorescences with slender or filiform pedicels, branching alternate or partially opposite. Calyx lobes lancolate. Corollas white or purplish to rarely rose, 3–13 mm long, funnelform, valvate, 4-lobed, not appendaged, glabrous to densely pubescent inside; heterostylous, with pin and thrum forms. Capsules subglobose to broader than long, where stages are first loculicidally then septicidally dehiscent. Seeds numerous, concavo-convex or obtusely ridged, one species with narrow wing, hilum central, punctiform, areoles isodiametric or radially elongated.

The genus name, *Mexotis*, is derived from *Mex-* as in Mexico and *-otis* as in *Hedyotis*, referring to an ear.

KEY TO SPECIES OF *MEXOTIS*

1. Plants decumbent or erect, slender and only slightly woody at base, height 15–55 cm; leaf blades 4–32(–45) × 3–24 mm; calyx lobes 0.4–1.5 mm long \_\_\_\_\_ **2. *M. latifolia***
1. Plants erect, with woody stems and stout woody bases, height 45–150 cm; leaf blades 25–110 × 8–40 mm; calyx lobes 1–6 mm long.
  2. Stems and inflorescence axes minutely hirtellous; seeds often obviously winged \_\_\_\_\_ **1. *M. galeottii***
  2. Stems and inflorescence axes glabrous; seeds not winged.
    3. Stipules to 10 mm long; calyx lobes 5–6 mm long; capsules 5.0–5.5 × 6–7 mm \_\_\_\_\_ **5. *M. lorencei***
    3. Stipules 2–4 mm long; calyx lobes 1–4.7 mm long; capsules 1–4.5 mm in diam.
      4. Inflorescences 3–15 × 6–18 cm; pedicels 7–32 long; calyx lobes 1–2 mm long; corollas 5–6.5 mm long; stipule appendages 1–2 mm long \_\_\_\_\_ **4. *M. terrellii***
      4. Inflorescences to 8 × 11 cm; pedicels 3–13 mm long; calyx lobes 1.5–4.7 mm long; corollas 7–13 mm long; stipule appendages only 0.3–0.5 mm long \_\_\_\_\_ **3. *M. kingii***

**1. *Mexotis galeottii*** (M. Martens) Terrell & H. Rob., comb. nov. (**Fig. 1A–D**). *Declieuxia galeottii* M. Martens, in Martens & Galeotti, Bull. Acad. Roy. Sci. Brux. 11:231. 1844. *Hedyotis galeottii* (M. Martens) Terrell & Lorence, Phytologia 66:1–4. 1989. TYPE: MEXICO. OAXACA: Llano Verde, 3–7000 ft, Apr 1840, H. Galeotti 2603 (HOLOTYPE: BR!; ISOTYPES: BR!, US!).

*Manettia liebmanni* Standley, J. Washington Acad. Sci. 17:337–338. 1927. TYPE: MEXICO. OAXACA: Pelado, Aug 1842, Liebmann 11485 (HOLOTYPE: C; ISOTYPE fragment: US 1315772!). PARATYPE: MEXICO. OAXACA: Cuesta de San Juan del Estado, Liebmann 11487 (C; fragment US 1315771!).

Perennial herbs or small shrubs. Stems 60–150 cm tall, to ca. 2.5 mm thick and woody toward base, stout, subterete, erect, glabrous or minutely hirtellous on upper stem and in inflorescence, few-several branched. Leaves with slender petioles 2–7 mm long, blades 40–85 × 12–38 mm, ovate or ovate-lanceolate, acuminate, glabrous above, glabrous or hirtellous on midrib beneath. Stipules 1–3 mm, broadly deltate, cuspidate with tip 1–2 mm long, glabrous or with few thick marginal teeth. Inflorescence with terminal, few-flowered cymes, branches densely and minutely hirtellous, flowers heterostylous, pedicels 2–7 mm long, very slender or filiform. Hypanthium glabrous; calyx lobes 1–2 × 0.3–0.7 mm, lanceolate, acute or submucronate, glabrous. Corollas 4.5–9.7 mm long, funnellform or broadly funnellform, white, glabrous externally; tubes 2.8–4 mm long, 1–2.5 mm wide at base, 2.2–4.5 mm wide at throat, densely puberulent within; lobes 2.2–5.2 × 1–2.5 mm, ovate, densely downy on adaxial face with white gland-tipped hairs. Pin flowers with stigma lobes 0.6–1.5 mm long, oblong or linear, exserted 1–2 mm beyond throat, anthers located at 3/4-point from base of corolla tube. Thrum flowers with anthers 1.0–1.5 mm long, linear or narrowly oblong, sessile or on filaments 0.5 mm long, attached at sinuses, stigmas located at midpoint of corolla tube. Capsules 2.2–4.0 × 2.2–4.5 mm, subglobose or somewhat compressed, 3/4–4/5 inferior, rather thick-walled, glabrous, loculicidally dehiscent. Seeds 0.8–1.2 × 0.8–1.2 mm, black, strongly compressed, very thin, flat, slightly to moderately concavo-convex, in outline orbicular or suborbicular, margins thin, wings present or absent, complete or partial, very narrow, 0.1–0.2 mm wide, fragile, hilum punctiform, testa finely reticulate, areoles radially elongated (Fig. 1). The pollen was found by Joan Nowicke (Terrell et al. 1986) to be similar to that of *Hedyotis kingii*. Chromosome number unknown.

*Distribution and Habitats*.—Forests and rocky slopes. México: Oaxaca. Llano Verde area, Sierra de Juarez, north of the city of Oaxaca; Veracruz, in Sierra Madre Oriental northeast and northwest of Xalapa.

*Notes*.—Additional nomenclatural and morphological notes were included in the Terrell and Lorence (1989) description of *Hedyotis galeottii*. The minute pubescence on the stems and inflorescence branches distinguish the species.

Additional specimens. Labelled *Hedyotis liebmanni* (see nomenclature above) and cited here based on data from D. H. Lorence. **MEXICO.** **Veracruz:** Mpio. Alto Lucero, El Cerro la Cima, entre Plan de las Hayas y Tierra Blanca, 1600m, Castillo C. & Narave 2158 (XAL); Mpio. Atzalan, Cerro del Aguila, 850 m, 10 Sep 1982, Ventura A. 19740 (ENCB); Mpio. Atzalan, Alseseca, 950 m, 24 Mar 1975, Ventura A. 11118 (ENCB); Mpio. Atzalan, La Calavera, 1000m, 27 Apr 1978, Ventura A. 15232 (ENCB); Mpio. Naolinco, Naranjillo, 1250 m, 13 Nov 1976, Ventura A. 13605 (ENCB); Mpio. Yecuatla, Santa Rita, 1450 m, 12 Feb 1973, Ventura A. 7824 (ENCB); Mpio. Yecuatla, Loma Santa Rita, 1480 m, 12 Jan 1972, Ventura A. 4764 (ENCB). **Oaxaca:** Yolox Rancho Grande, al oeste de Cuasimulca, Miranda 1094 (MEXU).

**2. *Mexotis latifolia*** (M. Martens & Galeotti) Terrell & H. Rob., comb. nov. (**Fig. 1E, F**). *Oldenlandia latifolia* M.

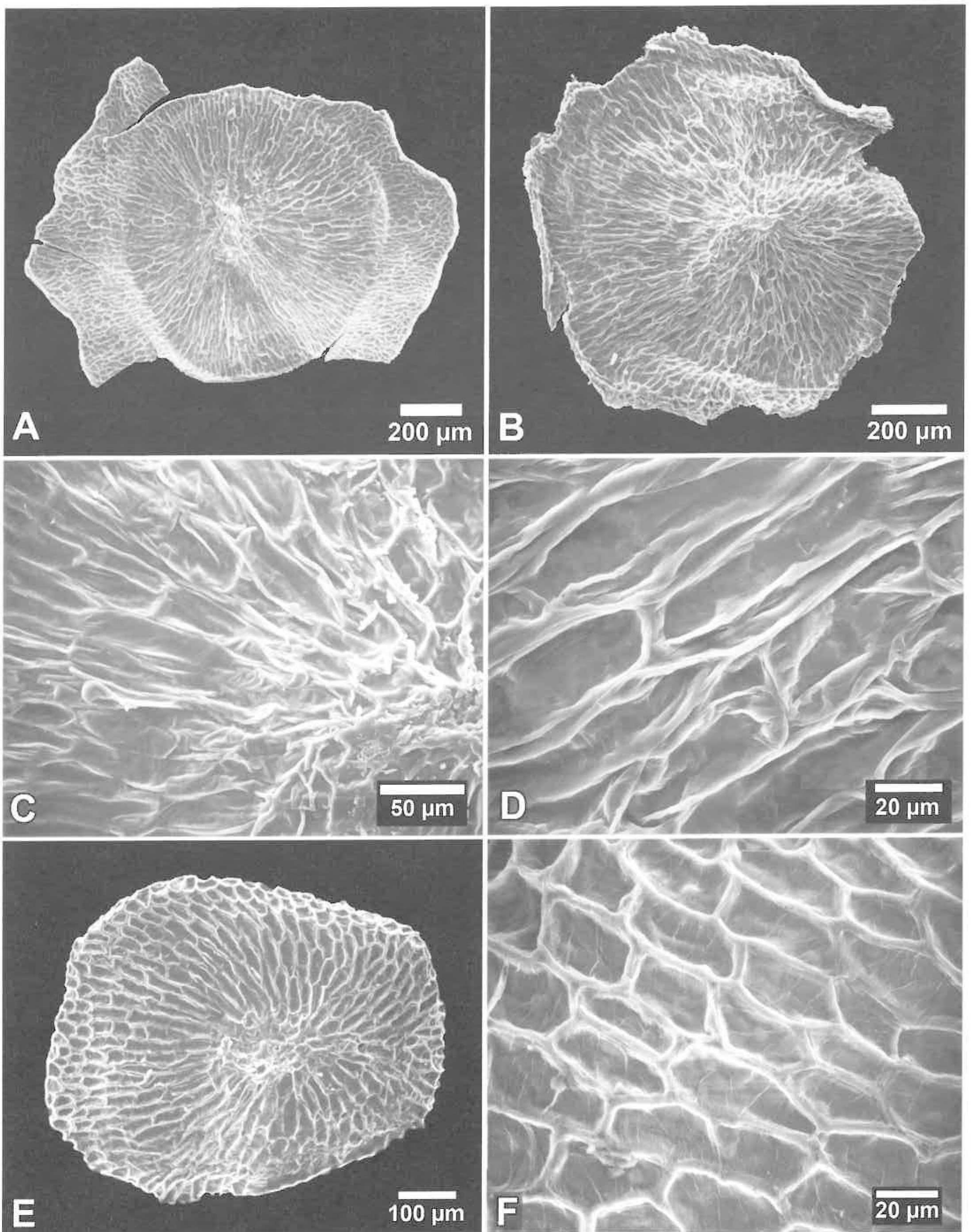


FIG. 1. Seeds examined by SEM. A–D. *Mexotis galeottii*. A. Castillo C. & Narave 2158 (XAL) Veracruz. B–D. Ventura A. 11118 (ENCB), Veracruz. E, F. *Mexotis latifolia*. Purpus 2951 (NY), Veracruz. A, B, E. Seeds, ventral views, flat, with/without wings. C. Areoles rectangular, radially elongated, showing hilum. D, F. Areoles enlarged.

Martens & Galeotti, Bull. Acad. Roy. Sci. Brux. 11:235. 1844. *Hedyotis latifolia* (M. Martens & Galeotti) Walp., Rep. 6:55. 1846. Type: MEXICO. Veracruz: Mirador, at 3000 ft, near Jalapa, May 1840, Galeotti 2556 (holotype: BR; isotypes: F! GH! K!).

*Hedyotis dichotoma* Sessé & Moc., Fl. Mexic. ed.2. 20.1893, non *H. dichotoma* Cav., Icon. 6:53. 1801. Type: Sessé, Mociño, Castillo, & Maldonado 556 (isotype: F!).

*Houstonia gracilis* Brandege, Zoe 5:238. 1907, non *Hedyotis gracilis* DC., Prodr. 4:419. 1830. Type: MÉXICO. Veracruz: on rocks near Orizaba, May 1905, C.A. Purpus 1251 (lectotype: UC! isolectotypes: F! MO!).

*Hedyotis exigula* W.H. Lewis, Rhodora 63:221. 1961. New name.

Perennial herbs with roots sometimes woody. Stems 15–55 cm tall, occasionally rather woody at base, tetragonal or rounded-tetragonal, slender, erect, decumbent or spreading, glabrous or rarely pubescent, sparsely to much branched. Leaves with petioles to ca. 10 mm long, blades 4–32(–45) × 3–14(–24) mm, median blades ovate to broadly elliptic or ovate-lanceolate, upper blades becoming lanceolate or linear-lanceolate, glabrous or puberulent above, glabrous beneath, base rounded to cuneate, apex obtuse or rather acute. Stipules to 2 mm long and wide, ovate or deltate, glabrous or short-pubescent, margin with several glandular teeth to ca. 1.5 mm long, apices truncate to lacerate. Inflorescence with terminal, few-flowered cymes, flowers heterostylous, closed at night, pedicels to 5(–10) mm long, very slender or filiform. Hypanthium glabrous or puberulent; calyx lobes 0.4–1.5 × 0.2–0.7 mm, scarcely to somewhat longer than capsules, erect, deltate to lanceolate, apices acute or obtuse, margins and sinuses glabrous or with white hairs to ca. 0.1 mm long. Corollas 3–7.3 mm long, funnelform or broadly funnelform, white, purplish, or rarely rose, glabrous externally; tube (2–)2.3–3.3(–4) mm long, usually 1–2 times longer than lobes, somewhat widened distally, 0.6–1.4 mm wide at base, 1.8–3 mm wide at throat, glabrous or puberulent within; lobes 1–3.3 × 0.6–2 mm, ovate, glabrous or puberulent within. Pin flowers with stigma lobes 0.4–1.3 mm long, linear, exserted 0.5–2 mm beyond corolla throat, style 2.4–4.3 mm long, filiform, anthers 0.5–0.8 mm long, 0.2 mm wide, narrowly oblong or elliptic, yellow or whitish, included near midpoint of corolla tube, sessile or subsessile. Thrum flowers with anthers 0.7–1.2 × 0.2–0.3 mm, narrowly elliptic or narrowly oblong, yellow or whitish, exserted at throat on filaments 0.2–0.8 mm long, stigma lobes 0.4–0.6 mm long, included near midpoint of corolla tube on style 1–1.6 mm long, filiform. Capsules 1–2.7 × 1–3.5 mm, usually slightly wider than long, or subequal, usually 3/4 to 9/10 inferior, moderately compressed, thin-walled, glabrous or with few hairs on calyx margins, cuneate or rounded toward base, apex retuse, dehiscing widely loculicidally and then septocidally. Seeds 8–24 per capsule, 0.5–1 × 0.4–0.9 mm, black, strongly compressed, very thin, slightly to moderately concavo-convex, in outline broadly elliptic to suborbicular, margins thin or slightly rounded, hilum punctiform, testa finely reticulate, areoles radially elongated (Fig. 1). Chromosome number:  $n = 17$  (Lewis in Terrell et al. 1986, as *Houstonia gracilis*).

Phenology.—Flowering throughout year.

Distribution and Habitats.—Moist soil, shaded places, banks, slopes, among rocks, sides and bases of cliffs, montane rain forest; altitudes recorded for a few collections vary from 330–1430 m (1000–4300 ft). Mexico: Veracruz (mainly from Cofre de Perote and Jalapa south to Orizaba), northern Oaxaca, Chiapas, and west and central Guatemala.

Notes.—Stephen Koch reported (pers. comm. 1980) that this species was for sale in Coyoacan, Mexico City, as a house plant. It grows rapidly and continually produces numerous small flowers.

Standley (1918) listed *Oldenlandia latifolia* as a synonym of *O. microtheca* DC., but the type of *O. latifolia* (see above) has flat seeds and reticulate testas, as opposed to *O. microtheca* (Schltdl. & Cham.) DC. which has angular seeds with the areole walls coalescent. The basionym *O. latifolia* thus supplants the previously accepted names, *Hedyotis exigula* and *Houstonia gracilis*.

A paper on *Oldenlandia* (Terrell & Robinson 2006) provided a key to *Oldenlandia microtheca* and *Hedyotis latifolia* (*Mexotis latifolia*), two superficially similar species differing by seed characters and chromosome numbers (the former  $n = 11$ , latter  $n = 17$ ).

*Mexotis latifolia* is a variable species. Its relationships to the other four species in *Mexotis* remain to be determined. It resembles *Houstonia purpurea* L. of eastern U.S. in aspect and leaf shape and size, but differs in seeds and reproductive characters.

Representative specimens: **MEXICO. Chiapas:** Lagos de Montebello, 42 km NE of La Trinitaria, 23 Oct 1971, *Breedlove & Thorne 21112* (DS, MICH, MO). **Veracruz:** mpio. Ixtaczoquitlan, Parque de Cervceria Moctezuma, 1 km SE of Fortin, 970 m, 9 Nov 1978, *Koch & Fryxell 78185* (CHAPA, ENCB, XAL); Cerro de Chichahuaxtla-Cuauhtlapan, 22 Jan 1968, *Marino Rosas R. 1034* (CAS, MO); Mt. Orizaba, *Seaton 101* (F, GH, K, NY, US); near Rio Blanco and Orizaba, 4300 ft, 15 Sep 1944, *Sharp 44889* (GH, MEXU, TENN, US); side road between Orizaba and Fortin, 3200 ft, 23 May 1973 *Terrell & King 4450*, (US); Tepejilotla, mpio. Chocaman, 29 Jun 1979, *Ventura A. 16282* (ARIZ, CHAPA, ENCB, MO). **GUATEMALA. Huehuetenango:** 5 mi SE of Barillas, Sierra de los Cuchumatanes, 1150 m, *Steyermark 49537* (GH).

**3. *Mexotis kingii*** (Terrell) Terrell & H. Rob., comb. nov. (**Figs. 2, 3**). *Houstonia kingii* Terrell, *Brittonia* 32:491. 1980. *Hedyotis kingii* (Terrell) G.L. Nesom, *Syst. Bot.* 13:434. 1988. TYPE: MEXICO. OAXACA: E-facing slopes, mountains along rt. 175, 28 km by road S of Valle Nacional on way to Ixtlan de Juarez; rain forest abounding in ferns, bromeliads, orchids, and aroids; elev. ca. 2000 m; not common; full sun; gravelly soil, 30 Jul 1959, R.M. King 2107 (HOLOTYPE: MICH!, 2 sheets, one flowering, one fruiting).

Perennial herbs with thick, woody roots. Stems to 45 cm tall, to ca. 5 mm thick and somewhat woody toward base, tan or straw-colored, subterete, rather stout, erect, glabrous, branched. Leaves with petioles to 10 mm long, blades 40–85 × 8–30 mm, elliptic, ovate, or lanceolate-ovate, acuminate, glabrous, slightly paler beneath. Stipules to 2 mm long, broadly rounded, lobed, the central lobe with recurved glandular hairs. Inflorescence in terminal, few-flowered cymes, widely branching, to 8 × 11 cm, flowers heterostylous, pedicels to 13 mm long, very slender or filiform. Hypanthium glabrous; calyx lobes 1.5–4.7 × 0.3–0.8 mm, 1/2–3/4 as long as corolla tube, linear or narrowly lanceolate, acute or acicular, sometimes divaricately spreading. Corollas 7–13 mm long, broadly funnelform, white or light purple, glabrous externally; tube 3–9 mm, 3–7 mm wide at throat, glabrous or puberulent within; lobes 2.5–7.0 × 1.5–3.3 mm wide, shorter than to slightly longer than the tube, ovate, glabrous or puberulent within. Pin flowers with stigma lobes 0.5–1.3 mm long, narrowly oblong or linear, near corolla throat or slightly exserted, anthers located at 1/3–1/4-point from base of corolla tube. Thrum flowers with anthers 1.3–2.0 mm long, narrowly oblong, purple, attached at corolla throat, subsessile or filaments to 1.5 mm long, stigmas located at 1/4-point from base to midpoint of corolla tube. Capsules (only previous year's dehisced capsules seen) 3–4 × 3–4 mm, subglobose, thin-walled, glabrous, 3/4–7/8 inferior. Seeds 0.6–1.1 × 0.5–0.9 mm, dark brown, moderately to slightly compressed, often polygonal in outline, obtusely angulate or obtusely ridged, margins rounded, hilum punctiform, testa finely reticulate, areoles small, isodiametric. Pollen illustrated in Terrell et al. 1986, figs 21, 22. Plant and seeds illustrated here in Figures 2, 3. Chromosome number unknown.

*Phenology.*—Flowering December to July.

*Distribution.*—México: Oaxaca. Original collection in a cloud forest of the Sierra Juarez range along or near highway 175 from Ixtlán de Juarez to Valle Nacional, 28 km south of Valle Nacional. Additional occurrences in Oaxaca cited below are mostly along hwy. 175 between Tuxtepec and Oaxaca city; the location of Tarabunde is unknown. On 22 July 1987 Stephen Koch and Terrell, somewhat hampered by a torrential rain, searched unsuccessfully for the species along Highway 175.

Additional specimens examined. **MEXICO. Oaxaca:** Distr. de Ixtlan, roadside, trop. vegetation with tree ferns, 24 mi S of Valle Nacional, Hwy. 175, 22 Mar 1978, *Poole et al. 1283* (LL); bosque mesofilo perturbado, 1750 m, 38 km S of Valle Nacional, 11 Apr 1976, *Rzedowski 34092* (ENCB); km 128 entre Llano de Las lores y Tuxtepec, 26 Dec 1965, *Delgadillo 121* (MEXU), reported by Lorence; Mpio. de Comaltepec, Hwy. 175, "Vista hermosa," selva secundaria, km 137, 1500 m, 11 May 1966, *Martinez Calderon 801* (ENCB, MEXU, XAL); Tarabunde, 7 Feb 1966, *MacDougal 17* (US); 22–26 mi S from Valle Nacional on Hwy. 175, cloud forest, 7 Jan 1989, *Todzia et al. 2839* (TEX).

**4. *Mexotis terrellii*** (Lorence) Terrell & H. Rob., comb. nov. *Hedyotis terrellii* Lorence, *Novon* 7:51.1997. TYPE: MÉXICO. OAXACA: Distrito de Mixe, Municipio de Totontepec, 3 km al SO de Totontepec, carretera a Mitla, 1910 m, bosque mesófilo, 6 Sep 1986, R. Torres C. & C. Martinez 9067 (HOLOTYPE: PTBG 12314; ISOTYPE: MEXU).

The following description is modified from that of David Lorence (1997). Perennial herbs. Stems 45–80 cm tall, branching from the base with several erect stems 2.0–3.5 mm diam. and somewhat woody toward base, terete, glabrous. Leaves with petioles 3.5–5 mm long, blades (25–)45–100 × 10–40 mm, elliptic to ovate-elliptic, the base often decurrent, apex acuminate, glabrous, chartaceous, margins sometimes with few small teeth. Stipule body to 4 mm long, truncate or deltate, with apical and lateral linear gland-tipped teeth 1–3

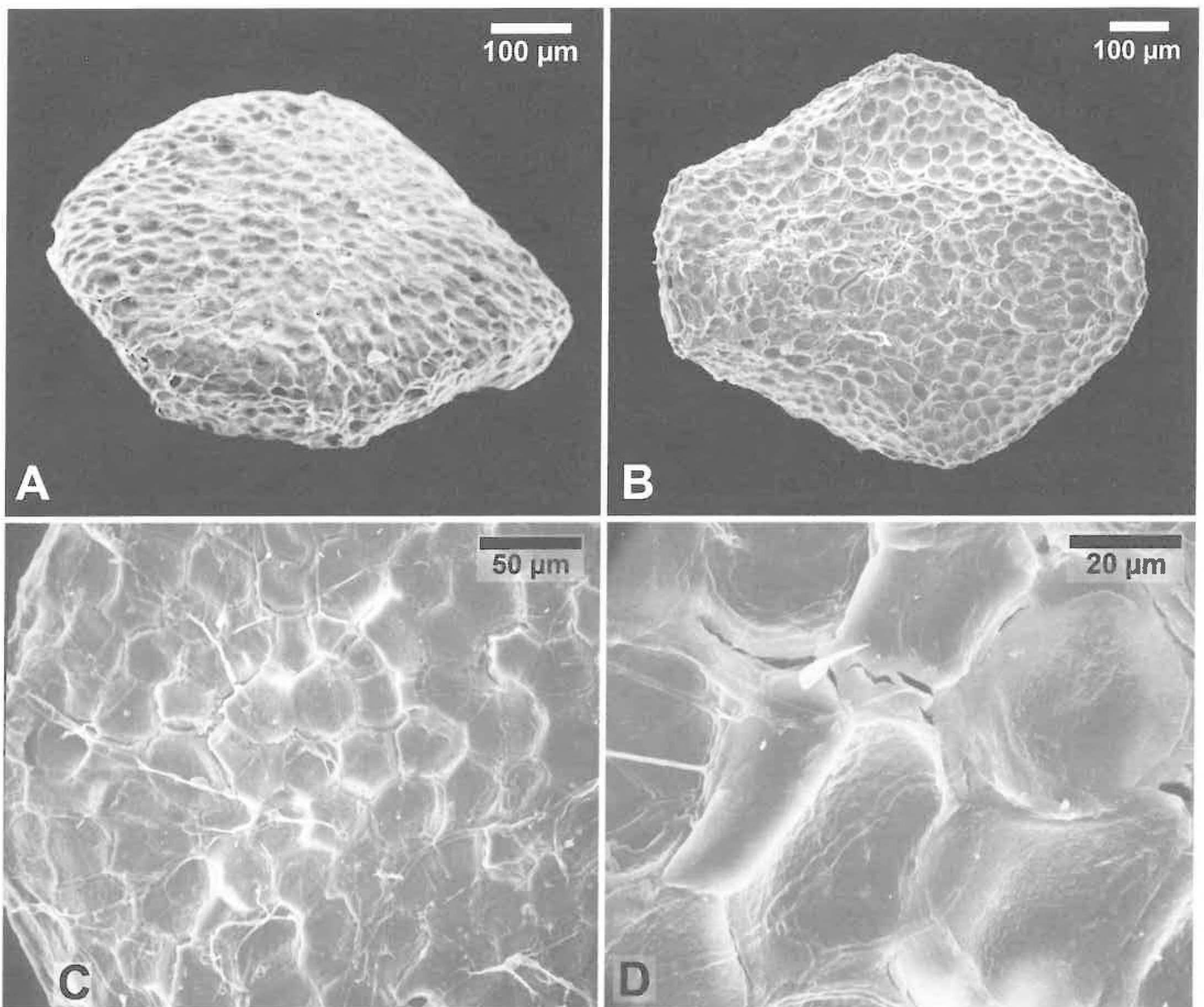


FIG. 2. Seeds of holotype of *Mexotis kingii* examined by SEM. A, B. Seeds polygonal, flat, slightly or somewhat thickened. C, D. Areoles mostly polygonal, not radially elongated.

mm long. Inflorescences terminal, compound cymes 3–15 × 6–18 cm, subtended by reduced leaves, branching dichasially to 2° or 3°, the primary branches 2–5 cm long, the axes slender, glabrous, subtended by stipule-like bracts, flowers on filiform pedicels 7–32 mm long. Hypanthium broadly obconic, glabrous. Calyx lobes 1–2 × 1–2 mm, deltate, glabrous. Corolla in bud quadrangular, rounded at apex, at anthesis 5–6.5 mm long; tube 2–2.5 mm long glabrous, lobes 3–4 mm long, erect or slightly spreading, elliptic, acute at apex, externally glabrous, internally villosulous with crinkled, white trichomes. Stamens attached near middle of tube below sinuses, the filaments 0.5 mm long, anthers 1 mm long, linear-elliptic, style 2–2.5 mm. Stigma lobes 1 mm long, linear. Capsules 2–3 × 3–4 mm, slightly wider than long, 1/2 inferior, thin-walled. Seeds immature. Plant illustrated in Lorence 1997.

*Phenology*.—Collected in flower in March, and in flower and fruit in June and September.

*Distribution*.—Known only from the area around the type locality in cloud forest at ca. 1900 m. near Totontepec in the mountainous Mixe District of Oaxaca.

*Notes*.—Lorence (1997) compared certain characters of *M. terrellii* with those of *M. galeottii* and *M. kingii*. *Mexotis terrellii* particularly resembles *M. kingii*, as summarized in Table 1.

Additional specimens examined. Paratypes: **MEXICO. OAXACA:** Distrito Ixtlán, Llano Verde, collector unknown, *Herb. Reichenbach filis III-396(W)*; Distrito Mixe, mpio. Totontepec, Totontepec, bosque mesófilo de montaña, 1900 m, 17°15'N, 96°02'W, 11 Mar 1990, Rivera R. &

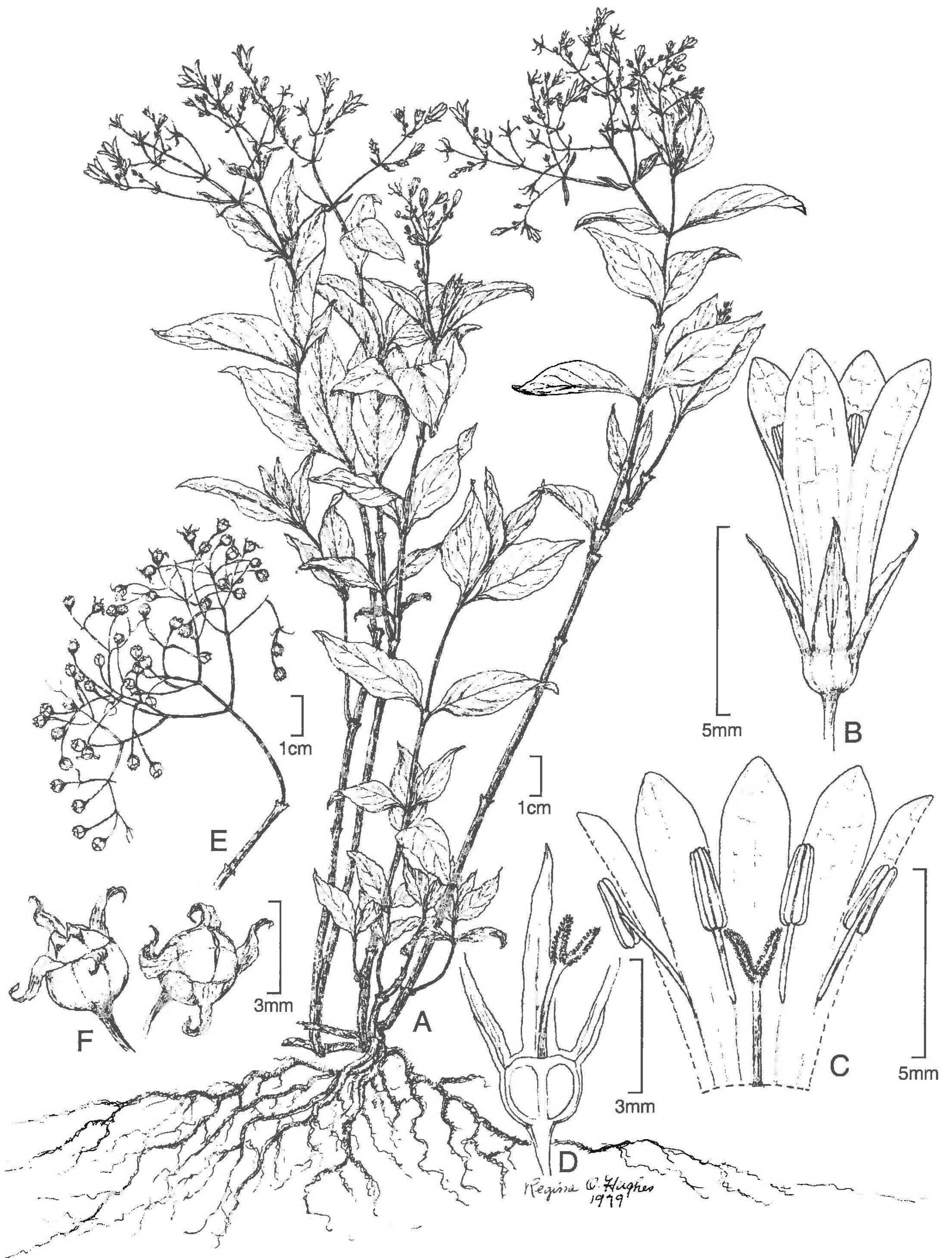


FIG. 3. *Mexotis kingii*, holotype. A. Habit. B. Flower. C. Corolla with stamens, style, and stigma. D. Ovary sectioned, with calyx lobes and stigmas. E. Inflorescence fruiting. F. Mature capsules. Drawing by the late Regina O. Hughes from Brittonia 32:492. 1980.



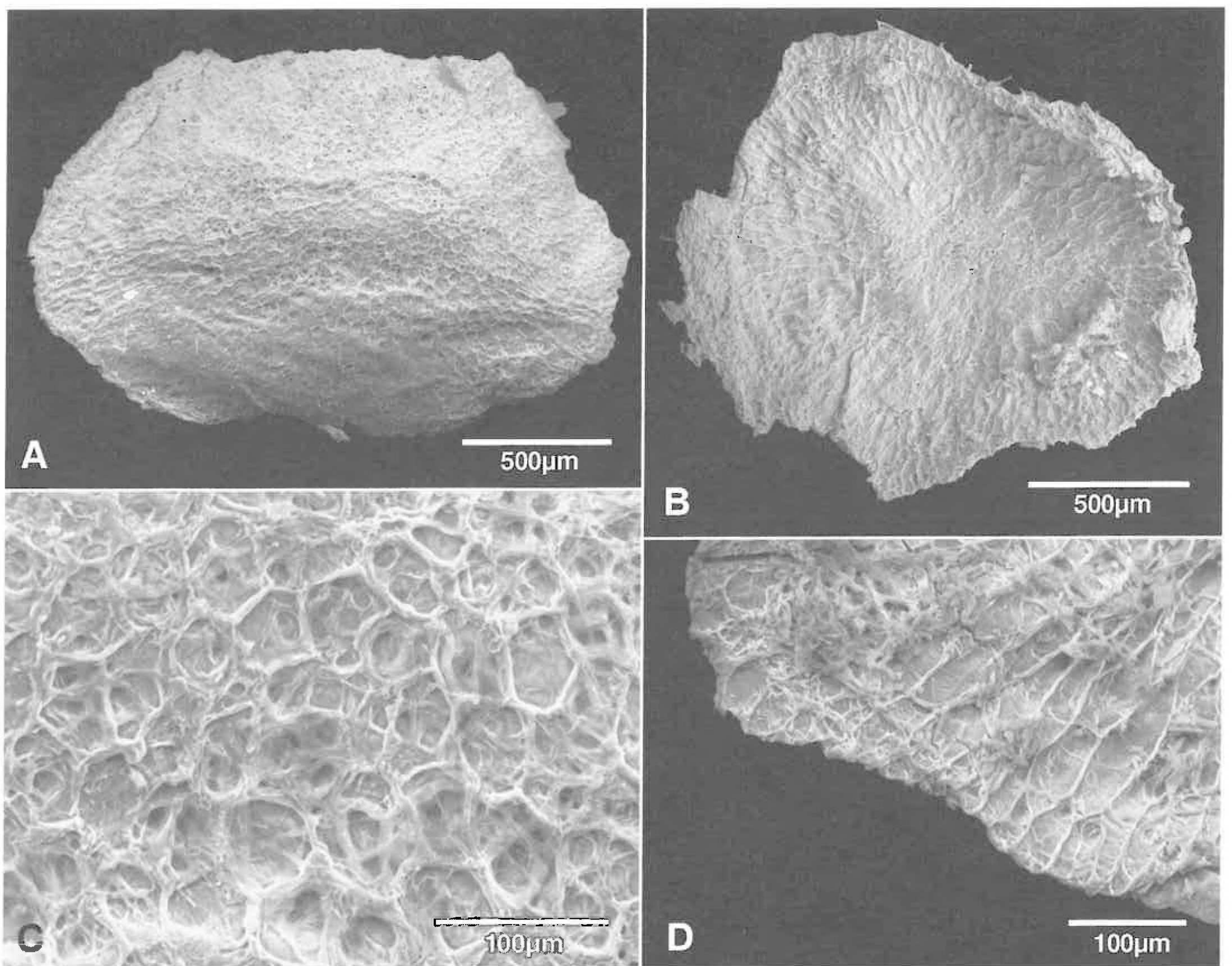


FIG. 4. Seeds of holotype of *Mexotis lorencei* examined by SEM. A. Dorsal convex surface. B. Ventral concave surface with narrow wing-like margin. C. Areoles, dorsal surface, isodiametric. D. Areoles, ventral surface, somewhat radially elongated.

*Martin* 1403 (PTBG, UC); Distrito Mixe, mpio. Totontepec, 2 km al SO de Totontepec, carretera a Oaxaca, 1900 m, 17 Jun. 1986, *Torres C & Téllez* 8643 (MEXU, PTBG).

**5. *Mexotis lorencei* Terrell & H. Rob., sp. nov. (Figs. 4, 5).** TYPE: MEXICO. OAXACA: Bosque de pino-encino perturbado, Distr. Santiago Juxtlahuaca, Mpio. San Martín Peras, 1 km de la desviación del poblado de Escopeta, km 24 carretera San Sebastián Tecomoxtlahuaca, Lat. 17.17 N. Long. 98.09 W, Alt. 2655 m, 29 Nov 1994, *J.I. Calzada* 19568 (HOLOTYPE: MEXU; ISOTYPE: PTBG).

Ad *Mexotida kingii* et *M. terrellii* simila sed in stipulis et lobis calycis et capsulis majoribus distincta.

This description is based only on one large branch in fruiting condition. Perennial herb to 80 cm tall. Stems 8 mm or more thick, widely branched. Leaves with slender petioles 10–25 mm long, blades 70–110 × 13–30 mm, elliptic or ovate-lanceolate, acuminate. Stipule body to ca. 5 mm long, with several linear apical and lateral gland-tipped teeth to 10 mm long. Inflorescence in fruiting condition only, pedicels to ca. 15 mm long, slender. Calyx lobes ca. 5–6 mm long, linear or narrowly lanceolate. Corollas lacking. Capsules mature, 5–5.5 × 6–7 mm, distinctly wider than long. Seeds (only a few available) 1.4–1.8 × 1.4–1.8 mm, dark brown, orbicular or broadly elliptic in outline, thin, strongly (cupulate) to moderately concave-convex, hilum punctiform, testa reticulate, areoles not clearly visible. Fig. 5.

*Distribution and habitats.*—The collection label stated “Negro con calizas,” which we suppose referred to black soil with limestone or limey soil. The locality was in a disturbed pine-oak forest on the west side of Oaxaca not far from the Guerrero border. This area is roughly 100 miles or 160 km from the other species and we have not seen any related collections from this part of Oaxaca.



*Mexotis lorencei* Tenell = H. Rob.  
 Isotype  
 Edward Tenell det.  
 d.d. H. Robinson, U.S. National Herbarium 2009

*Mexotis* sp. nov.  
 Santa Gloria, comuna de Comala, Jalisco, México  
 Very common.  
 DETERMINED BY: David H. Lorence 2005  
 National Tropical Botanical Garden Herbarium (PTBG)

Low 2005 R-1

Zona de la Comuna de Comala 576  
 PLANTAS DE MEXICO: Jalisco  
 Fam. RUBIACEAE  
 Distr. Santiago Juchitán, W. Jalisco, San Martín Peras, loc. 1 km de la desviación del poblado de Escopeta, No 24 carretera San Sebastián Tecomanitlanera. Lat. 17.17° N Long. 96.09° W alt. 2655 m. n. s. n.  
 Bosque de pino-encino perturbado. Suelo Negro con calizas. Hierba de 80 cm. Fruto verde. Planta escapa. HBK.  
 J.J. Calzada 1958 28-noviembre-1994  
 HERBARIO NACIONAL DE MEXICO (MEXU)  
 INSTITUTO DE BIOLOGIA, UNAM

FIG. 5. *Mexotis lorencei*, J.J. Calzada 19568, isotype (PTBG).

TABLE 1. Morphological characters of five species in genus *Mexotis*.

	<i>M. galeottii</i>	<i>M. latifolia</i>	<i>M. kingii</i>	<i>M. terrellii</i>	<i>M. lorencei</i>
<b>Stems</b> height cm	60–150	15–55	to 45	45–80	to 80
<b>Leaf</b> blades L × W mm	40–85 × 12–38	4–32(–45) × 3–24	40–85 × 8–30	25–100 × 10–40	70–110 × 13–30
<b>Inflor.</b> L × W cm	3.5 × 2.5–5	no data	to 8 × 11	3–15 × 6–18	no data
pedicel L mm	2–7	to 5(–10)	3–13	7–32	to 15
vesture	hirtellous	glabrous	glabrous	glabrous	glabrous
<b>Calyx</b> lobes L mm	1–2	0.4–1.5	1.5–4.7	1–2	5–6
<b>Corollas</b> L mm	4.5–9.7	3–7.3	7–13	5–6.5	no data
tubes L	2.8–4	2–4	3–9	2–2.5	
inner vesture	villous	glab./puberulent	glab./puberulent	glabrous	
lobes L	2.2–5.2	1–3.3	2.5–7.0	3–4	
<b>Capsules</b> L × W mm	2.2–4.0 × 2.2–4.5	1–2.7 × 1–3.5	3–4 × 3–4	2–3 × 3–4	5–5.5 × 6–7
<b>Seeds</b> L × W mm	0.8–1.2 × 0.8–1.2	0.5–1.0 × 0.4–0.9	0.6–1.1 × 0.5–0.9	immature; no data	1.4–1.8 × 1.4–1.8

*Notes.*—We name this species for David Lorence, who called our attention to the Calzada collection and who has contributed much to knowledge of Rubiaceae in Mexico.

This species resembles the other three species with stout woody stems and large leaves. Although only one collection is known, there are capsule, seed and stipule characters for consideration. The capsules and seeds are distinctly larger than in other species. The seeds have a thin, strongly (cupulate) to moderately concavo-convex body. Other species in this genus have flat or slightly concavo-convex seeds.

#### ACKNOWLEDGMENTS

David Lorence provided loans and important data on *Mexotis galeottii*, *M. terrellii*, and *M. lorencei*. In earlier times Stephen Koch provided very helpful field assistance. We thank Scott Whittaker, Electron Microscope Laboratory, Smithsonian Institution, for the SEM illustrations, and Marjorie Knowles and Alice Tangerini for preparing the figures. David Lorence and Warren Wagner are thanked for providing in-depth reviews of the manuscript. The curators of the cited herbaria helpfully provided Terrell with loans during a number of years long past.

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